



PATENT  
3430-0131P

IN THE U.S. PATENT AND TRADEMARK OFFICE

In Re Application of

Before the Board of Appeals

Kwang-Jo Hwang

Appeal No.

Appl. No.: 09/648,111

Group: 2815

Filed: August 25, 2000

Examiner: N.D. Richards

Conf. No.: 5562

For: METHOD OF PATTERNING A METAL LAYER IN A  
SEMICONDUCTOR DEVICE

**REPLY BRIEF**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

February 5, 2007

Sir:

This Reply Brief is respectfully submitted on behalf of Appellant in response to the newly submitted arguments of the Examiner in the Examiner's Answer dated December 4, 2006, which issued in connection with the above-identified application and appeal. In accordance with 37 C.F.R. § 41.41, these new points of argument are responded to in the instant Reply Brief.

**Status Of The Claims**

A. Total Number of Claims

There are 30 claims pending in the application.

B. Current Status of Claims

1. Claims 1-11 and 13-31 are pending in the application.
3. Claims 1-11 and 13-31 are rejected.

C. Claims on Appeal

The claims on appeal are claims 1-11 and 13-31.

**Grounds Of Rejection To Be Reviewed On Appeal**

The first issue presented for review is whether U.S. Patent No. 5,771,110 to Hirano et. al. (Hirano) in view of U.S. Patent No. 6,133,145 to Chen (Chen) suggest all the elements of claims 1, 2, 5-9, 11,13, 15, 16, 20-22, 24 and 28-31 sufficient to support an obviousness rejection under 35 U.S.C. § 103(a).

The second issue presented for review is whether the combination of Hirano, Chen and further in view of U.S. Patent No. 5,968,847 to Ye et al. (Ye) suggest all the elements of claims 10, 17-19 and 25-27 to support an obviousness rejection under 35 U.S.C. § 103(a).

The third issue presented for review is whether the combination of Hirano, Chen and further in view of JP 361002368 to Muraguchi et al. (Muraguchi) suggest all the elements of claims 3, 4, 14 and 23 to support an obviousness rejection under 35 U.S.C. § 103(a).

### Argument

#### New Points of Argument in the Examiner's Answer

At pages 3 to 13 of the Examiner's Answer, the Examiner repeats the art rejections over using language virtually identical to the rejections set forth at pages 2 to 11 of the Office Action of February 3, 2005.

At pages 14 to 26 of the Examiner's Answer, the Examiner responds to the arguments in the Appeal Brief. The Examiner's new points of argument (and rebuttal) are as follows:

1) At page 14, lines 10-17 of the Examiner's Answer, the Examiner asserts that a *prima facie* case of obviousness has been established over the appealed claims. However, none of the applied art of Hirano, Chen, Ye or Muraguchi explicitly teaches or suggests reducing the internal binding force of the metal so as to increase the etch rate, such as is set forth in independent claims 1, 22, 30 and 31 of the present invention. In order to allege obviousness, every limitation of the claims must be taught or suggested by the prior art.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All the words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

In this case, the Examiner has failed to point exactly where in the references of Hirano, Chen, Ye or Muraguchi a teaching or suggestion resides to reduce the internal

binding force of the metal so as to increase the etch rate, such as is set forth in independent claims 1, 22, 30 and 31 of the present invention.

2) At various places in the Reply Brief, the Examiner argues that the claimed reduction in binding force is a necessary result of the combination of Chen and Hirano (see, e.g., page 15, lines 9-11). Typically, the Examiner at page 16, lines 12-16 states: "Hirano by itself does not teach reducing the internal binding force, the rejection as a whole does teach this limitation since the references as combined will necessarily result in the reduction of internal binding force." By this, the Examiner is essentially using inherency arguments in order to supply a limitation that the cited art references fail to disclose or suggest.

However, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *See In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

Further, the Federal Circuit stated in *In re Robertson*, that "to establish inherency, extrinsic evidence must make clear that the missing descriptive matter was necessarily present in the thing described in the reference, and would be so recognized by persons with ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 49 USPQ2d 1949 (Fed. Cir. 1999). Additionally, it has been held that the mere fact that a certain thing may result from a given set of circumstances is not sufficient, and occasional results are not inherent. *MEHL/Biophile International v. Milgraum*, 192 F.3d 1362, 52 USPQ2d 1303 (Fed. Cir. 1999).

In this case, the Examiner has failed to provide extrinsic evidence demonstrating that the reduction in binding force would necessarily result from the combination of Hirano and Chen. The Examiner merely theorizes that the plasma treatment of photoresist by Chen can be applied to treating the metal layer of Hirano (Reply Brief at page 16, lines 3-7). However, this combination changes the principal of operation of Chen. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

3) At pages 22-26 of the Office Action, the Examiner refuses to acknowledge the unexpected results of the present invention, such as is typified by Figure 7 of the application (reproduced below).

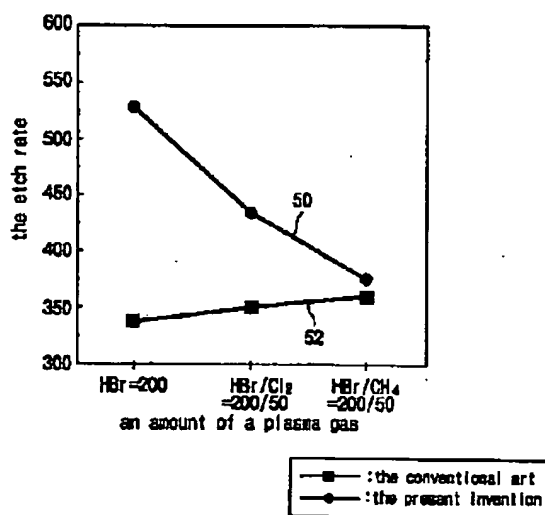


FIG.7

As is shown in Figure 7 of the present invention (and as discussed at page 7 of the specification), the present invention shown in curve 50 achieves an etch rate substantially higher than that of the conventional technology. As a result, lowering the internal binding force of the metal layer achieves results that are truly unexpected when compared to the applied art references (which teach nothing about internal binding force.).

However, at page 22, lines 11-15 of the Advisory Action, the Examiner notes that Applicant's Figure 7 has no comparison to the applied art references. However, it is impossible to compare to the applied art references because, as noted above, the principal of operation of the references has been changed by applying a photoresist etch process to a metal. In the paragraph bridging pages 22 and 23 of the Advisory Action, the Examiner asserts that the etch rate data in Figure 7 is not "about twice as high", but merely 1.5 to 1.6 times higher than the conventional art. Thus by the Examiner's own admission, the present invention shows a significant improvement over the conventional art. This conventional art is typified by the applied references of Hirano, Chen, Ye and Muraguchi.

At pages 24 to 26 of the Advisory Action, the Examiner asserts that even if Applicant's Figure 7 shows unexpected results, then these results are insufficient to overcome the *prima facie* obviousness of the present invention. The Examiner then quotes extensively from MPEP § 2145 to support his position.

However, both the inability to establish *prima facie* obviousness and the unexpected results should be viewed synergistically as establishing patentability of the claimed invention. "The determination of obviousness, *vel non*, requires that all the evidence be considered together . . . if rebuttal evidence of adequate weight is produced, a holding of *prima facie* obviousness, being but a legal inference from previously

uncontradicted evidence, is dissipated. The objective evidence of unobviousness is not evaluated for its 'separate knockdown ability' against the 'stonewall' of the *prima facie* case . . . but is considered together with all other evidence, in determining whether the invention is as a whole would have been obvious to a person of ordinary skill in the field of the invention." (Citations omitted). *Applied Materials Inc. v. Advanced Semiconductor Materials*, 98 F.3d 1563, 1574, 40 USPQ2d 1481, 1486 (Fed. Cir. 1996).

In the rejections, the Examiner has failed to find and provide a clear disclosure or suggestion of the reduced internal energy of the metal layer. The Examiner has further changed the principal of operation in order to combine references. As noted above, the rebuttal evidence must be considered in combination with the weaknesses of the unrebutted rejections. As a result, the Examiner has failed to establish a *prima facie* case of obviousness or to adequately respond to its rebuttal as evidenced by the increased etch rate of the present invention.



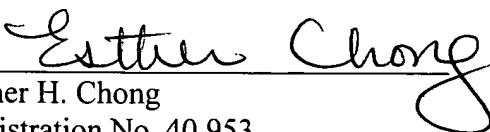
**Conclusion**

Based on the above considerations, the Appellant accordingly continues to maintain that the Examiner's prior art rejections remain improper, both in fact and in law. The Examiner's new points of arguments have not changed this position. The Appellant therefore respectfully request the Board of Appeals reverse the Examiner's final rejections of the appealed claims and render a decision favorable to the Appellants.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: February 5, 2007

Respectfully submitted,

By   
Esther H. Chong  
Registration No. 40,953  
BIRCH, STEWART, KOLASCH & BIRCH, LLP  
P.O. Box 747  
Falls Church, VA 22040-0747  
(703) 205-8000

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